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excitation attendant on the transition from one state of excitability to another. As a state of reduced excitability, the psycho-physic process that underlies sensations is thus directly proportional to the intensity of the stimulus. By using as his stimulus the change from anelectrotonus to katelectrotonus, and correcting for the movement of the indifference point along the myopolar tract, Müller was able to study states of increased excitability, and the effects of transition from reduced to increased excitability, although in a preliminary way, respecting which fuller results are promised. His work is in the line of Dewar and McKendrick, Bernstein and Ward, indicating that the sensation is directly as nervous action, and that the logarithmic relation holds between the stimulus and the amount of neural excitation. He attempts, however, to subsume Fechner and Weber under the law of stimulation by changed electrotonic state. The author's fuller results will be awaited with interest.

Untersuchungen über das Tongedächtniss. Von H. K. WOLFE.
Wundt's Philosoph. Studien. III. 4.

Dr. Ebbinghaus studied the function of memory as a reproductive faculty by counting the number of repetitions of a variable series of nonsense syllables, necessary to enable the learner to repeat them at will after a given interval, also subject to variations. Mr. Wolfe's study is upon memory as a recognizing faculty; evidently an easier and more extended power. In a second reading of a book, for example, we recognize as familiar much more than we could have repeated of the contents. The author used a series of nearly three hundred vibrating metal tongues, giving the tones through five octaves, and proceeding by intervals of two vibrations in the two lower, and of four vibrations in the three higher octaves. In the different series of experiments, certain of these tones were chosen as standards, and after sounding one of them for one second, a second tone, either the same or one differing from it by four, eight or twelve vibrations (higher or lower), was sounded at a variable interval, and the subject was required to say whether the second tone was the same or different from the first, and if different, whether higher or lower. Besides the answer could be "undecided," and also "different but undecided whether higher or lower." By adopting such a cumbrous method, and allowing the subject as many as five kinds of answers, Mr. Wolfe has very much diminished the value of his tables. For example, one of his strongest points is that we can tell whether two tones are equal more accurately than whether they are different. This does not at all follow from his tables. When the subject said "higher" or "lower," and was wrong, it may have been that the tones were really *different*, and thus the subject was only half wrong; *i. e.*, he recognized the difference, but not the direction of the difference. If we thus add the number of cases in which the direction of the change was recognized to the number in which the difference only was recognized, and estimate how many of the cases in which the direction of the change was misjudged, the fact of a change was recognized (on which point the tables are silent) as only one-half, it looks very much as though this statement did not hold. It is an excellent example of the mischievous effect of a poor method of experimenting or of stating one's results.

The general results of the paper, however, are probably not seriously vitiated by this inaccuracy, and may be summarized thus: The accuracy of the memory for tone sensations is very great; it is much more difficult to recognize the direction in which a tone has been altered than to detect the alteration itself. This seems to be a peculiarity of tone sensations, as it does not hold for sight or touch. The longer the interval between the sounding of the two tones, (variable from 1-30, 60, or 120 seconds), the smaller the chances of recognizing the tone; and this process of forgetting takes place at first very rapidly and then very slowly. It is made probable that the interval must increase in a geometrical ratio to produce an arithmetical series of (approximately) equal degrees of forgetting. A constant and peculiar deviation from this law occurs after an interval of 20-30 seconds; then there is a rhythm in the memory itself, and the curve of forgetfulness rises slightly. It was also noted that a low tone is not as easily recognized as a high one; that unmusical ears tend to judge low notes too low and high ones too high; that the effect of practice is at first marked, but soon diminishes, as is its general law; and, that the recovering power of the ear is so great that fatigue has little effect.

J. JASTROW.

The Conception of Love in some American Languages. By D. E. BRINTON. Proc. Am. Philos. Soc. December, 1885. pp. 536-62.

Dr. Brinton has studied the history and derivation of terms of affection as furnishing illustrations of the origin and growth of the sentiments of love and friendship; and has sought to show the parallelism that everywhere appears in the workings of the human mind. The principal words expressing love in the Aryan languages can be traced back to two main ideas, one denoting similarity between the persons loving, the other denoting a wish or desire. The same notions underlie the majority of words expressing love in the American languages studied.

The following classification of the original modes of expression for conceptions of love is given, the names of the languages being given in parenthesis:

- 1.—Inarticulate cries of emotion, (Cree, Maya, Qquichua).
- 2.—Assertions of sameness or similarity, (Cree, Nahuatl, Tupi, Arawack).
- 3.—Assertions of conjunction or union, (Cree, Nahuatl, Maya).
- 4.—Assertions of a wish, desire or longing, (Cree, Cakchiquel, Qqueichua, Tupi).

W. H. BURNHAM.

Coma. By CHARLES MERCIER, M. D. Brain, Jan., 1887.

The writer, who avows himself a follower of Dr. Hughlings-Jackson, seeks to enforce Mr. Savory's proposition to restrict the present very vague meaning of coma to "cases where there is a state of insensibility from which the patient cannot be completely aroused, together with a tendency to death by asphyxia," except that for "insensibility" our author would substitute "evidence of defect of consciousness." This includes cases of partial consciousness and cases where consciousness may exist, but is not made evident by common tests. Four stages are distinguished. "The finest, most delicate and most elaborate movements and those associated with